

GIS-based irrigation water management for precision farming of rice

ABSTRACT

Precision farming aims to manage production inputs over many small management zones rather than on large zones. It is difficult to manage inputs at extremely fine scales, especially in the case of the rice irrigation system. However, site-specific irrigation management can potentially improve the overall water management in comparison to irrigated areas of hundreds of hectares. A critical element of the irrigation scheduling and management is the accurate estimation of irrigation supplies and its proper allocation for the irrigation offtake structures based on the actual planted areas. All irrigation scheduling procedures consist of monitoring indicators that determine the need for irrigation. The final decision depends on the irrigation criterion, strategy and goal. Irrigation scheduling is the decision of when and how much water to apply to a field. The amount of water applied is determined by using a criterion to determine irrigation need and a strategy to prescribe how much water to apply in any situation. The right amount of daily irrigation supply and monitoring at the right time within the discrete irrigation unit is essential to improve the irrigation water management of a scheme. This paper presents the GIS capability to achieve the goal in the view of irrigation strategy and goal with special reference to precision farming of rice. The GIS-based water management model was developed for the scheduling daily irrigation water deliveries and regular monitoring of irrigation delivery performance. The 'Scheduling' program computes the right amount of irrigation deliveries based on crop water requirements. The 'Monitoring' program gives information on the uniformity of water distribution and the shortfall or excess. The displayed results allow the manager to view maps, tables and graphs in a comprehensible form to ease decision making that where the irrigation amount will be delivered as the season progresses. GIS was used as a useful tool to assist the irrigation water management program in the context of precision farming.

Keyword: Farming; GIS; Irrigation; Monitoring; Precision; Rice